

BASIS FOR THE AMENDMENT

Claim 7 has been amended to correct minor informalities.

New Claims 17-20 are supported by the specification as originally filed.

New Claim 21 has been added based on Claims 1 and 8.

No new matter is believed to have been added by entry of this amendment. Entry and favorable reconsideration are respectfully requested.

Upon entry of this amendment Claims 1-2, 4-21 will now be active in this application.

REMARKS

Applicants wish to thank Examiner Moore for the helpful and courteous discussion with Applicants' Representative on September 18, 2008. The following is intended to expand upon the discussion.

Applicants respectfully request reconsideration of the application, as amended, in view of the following remarks.

The rejection of Claims 7 and 8 under 35 U.S.C. § 112, 2nd paragraph, is obviated by the amendment of these claims.

The Examiner adheres to the rejection of

- (1.) Claims 1, 2, 4-6 and 9-16 under 35 U.S.C. § 103(a) over Geck et al,
- (2.) Claims 1, 2, 4-7 and 9-15 under 35 U.S.C. § 103(a) over Mautner et al, and
- (3.) the provisional obviousness-type double patenting rejection of Claims 1, 2 and 4-16 over claims 18-25 of co-pending application Serial No. 10/501, 467.

The following new prior art rejection was added

- (4.) Claims 1, 2, 4-16 under 35 U.S.C. § 103(a) over Brandstetter in view of Geck and Mautner.

These rejections are traversed.

It is noted that new Claims 17-21 have been added.

Specifically, as claimed in Claim 1, the invention relates to an impact-resistant molding material, comprising:

poly(meth)acrylate, and

at least one silicone rubber graft copolymer comprising

from 0.05 to 95% by weight, based on the total weight of the copolymer, of a core a) comprising an organosilicon polymer which has the general formula $(R_2SiO_{2/2})_x \cdot (RSiO_{3/2})_y \cdot (SiO_{4/2})_z$ where x = from 0 to 99.5 mol%, y = from 0.5 to 100 mol%, z = from 0 to 50 mol%, where R means identical or different alkyl or alkenyl radicals having from 1 to 6 carbon atoms, aryl radicals, or substituted hydrocarbon radicals,

from 0 to 94.5% by weight, based on the total weight of the copolymer, of a polydialkylsiloxane layer b), and

from 5 to 95% by weight, based on the total weight of the copolymer, of a shell c) comprising organic polymers, wherein the core a) encompasses vinyl groups prior to the grafting process, and the shell c) is obtained via free-radical polymerization of a mixture in which acrylic esters and methacrylates are present,

wherein the ratio by weight of acrylic ester to methacrylate in the mixture for preparing the shell c) is in the range from 50:50 to 1:99.

It is submitted that the claims are NOT obvious over Geck et al or Mautner et al, OR over Brandstetter in view of Geck and Mautner within the meaning of 35 U.S.C. § 103.

As agreed by the Examiner, Geck et al or Mautner et al fail to disclose or suggest an impact-resistant molding material as claimed comprising **PMMA** and in which the at least one silicone rubber graft copolymer composed ofcomprises from 5 to 95% by weight, based on the total weight of the copolymer, of a shell c) composed ofcomprising organic polymers, characterized in that wherein the core a) encompasses vinyl groups prior to the grafting process, and the shell c) is obtained via free-radical polymerization of a mixture in which acrylic esters and methacrylates are present, wherein the ratio by weight of acrylic ester to

methacrylate in the mixture for preparing the shell c) is in the range from **50:50 to 1:99**. See Examiner's Answer at page 8, 3rd full paragraph.

The Examiner states that Geck et al use the final products as powder coatings rather than as molding material. See Examiner's Answer at page 8, 4th full paragraph.

Geck et al disclose another type of elastomeric particles which are pre-crosslinked. See col. 2, lines 41 and 58-59. The particles are used to modify **coatings** and not molding materials as claimed. See col. 2, lines 43 and 56-57. The ratio by weight of acrylic ester to methacrylate in the mixture for preparing the shell c) in the range from **50:50 to 1:99** is not disclosed in Geck et al.

Mautner et al describe the composition and process of preparation of elastomeric particles. See col. 2, starting at line 64. However, the notched impact strength of the particles is very low compared to that of the present invention (see Tables below) because the ratio by weight of acrylic ester to methacrylate in the mixture for preparing the shell c) in the range from **50:50 to 1:99** is not disclosed in Mautner et al.

Geck et al or Mautner et al do not recognize that the claimed ratio by weight of acrylic ester to methacrylate in the mixture for preparing the shell c) in the range from **50:50 to 1:99** gives superior results in impact strength.

The Examples in the specification describe the superior properties of the present invention as discussed in the Appeal Brief with reference to Tables 4 and 5 at pages 23-29 of the specification. The Examples relate to preferred embodiments in which in shell c) methyl methacrylate and ethyl acrylate are mixed. See Table 1 at page 24 of the specification. Comparative Examples 1 and 2 only use methyl methacrylate as monomer in shell c) (modifiers B and C in Table 1). As noted by the Examiner, Example 3 of Geck et al only

shows a shell using polymethyl methacrylate. See Examiner's Answer at page 3, 2nd full paragraph from the bottom.

So, **Geck et al** therefore suggest that it makes no difference whether a ratio by weight of acrylic ester to methacrylate in the mixture for preparing the shell c) in the range from **50:50 to 1:99** is used or whether only polymethyl methacrylate is used.

Thus, there is no suggestion to use the claimed ratio and to thereby improve the impact resistance as shown by the data of the specification.

Comparative Examples 1 and 2 represent a comparison with the closest Example of Geck et al as they only use methyl methacrylate as monomer in shell c) (modifiers B and C in Table 1 of the specification). As discussed in the Appeal Brief, from the data set out in Table 4 it can be seen that modifiers obtained by grafting a shell comprising a mixture in which acrylic esters and methacrylates are present onto a vinyl-containing core can give an **excellent improvement in the impact resistance of PMMA** molding materials. Note the much higher Mini-Vicat and Izod NIS values in Tables 4 and 5 of the specification.

As noted by the Examiner, Mautner et al prepare shells using polymethyl methacrylate. See Examiner's Answer at page 6, 1st full paragraph.

So, **Mautner et al** therefore suggest that it makes no difference whether a ratio by weight of acrylic ester to methacrylate in the mixture for preparing the shell c) in the range from **50:50 to 1:99** is used or whether only polymethyl methacrylate is used.

Thus, there is no suggestion to use the claimed ratio and to thereby improve the impact resistance as shown by the data of the specification.

Table 4

	Inventive example 1	Comparative example 1	Comparative example 2
Die swell [%]	22.7	15.4	26.7
Viscosity η_s (220°C/5 MPa) [Pa s]	2180	2447	2075
Mini-Vicat [°C]	100.5	99.1	98.7
Izod NIS [kJ/m ²] 23°C	5.6	3.22	5.25
-20°C	5.0	2.88	4.18
-40°C	4.4		
Modulus of elasticity [MPa]	2320	2129	2277

Table 4: Continuation

	Inventive example 2	Inventive example 3	Inventive example 4
Die swell [%]			
MVR (230°C/3.8 kg) [cm ³ /10 min]	2.25	1.94	2.45
Mini-Vicat [°C]	101.0	100.6	100.9
Izod NIS [kJ/m ²] 23°C	6.4	5.7	6.1
-20°C	5.4	4.5	5.3
Modulus of elasticity [MPa]			

Table 5

	Inventive example 1	Comparative example 3	Inventive example 6
Die swell [%]	22.7	25	19.8
Viscosity η_s (220°C/5 MPa) [Pa s]	2180	1930	2380
Mini-Vicat [°C]	100.5	100	100
Izod NIS [kJ/m ²] 23°C	5.6	4.3	6.4
Modulus of elasticity [MPa]	2320	2400	2200

Table 5 shows that mixtures of acrylate rubber modifiers with silicone rubber modifiers have superior impact resistance values at room temperature. The selection of the mixtures was such that their softening point was similar. This improvement in impact resistance values at room temperature is attributable to unforeseeable synergy.

Further, Brandstetter does not disclose a silicon rubber graft copolymer (see the Office Action of June 23, 2008 at page 3, 3rd to last paragraph, and the combination of Brandstetter in view of Geck and Mautner does not disclose the superior properties obtained using such graft copolymer as discussed above.

These superior results are not disclosed or suggested by Geck et al or Mautner et al, or Brandstetter in view of Geck and Mautner.

Further, none of Geck et al or Mautner et al, or Brandstetter in view of Geck and Mautner disclose or suggest that a content of vinyl groups in the core a) prior to grafting is in

the range from 0.5 to 10 mol %, wherein the mol % represent the molar proportion of the vinyl-containing monomers which for the purposes of calculation have one vinyl group, in all of the monomeric organosilicon compounds used to prepare the core a). **See Claim 17.**

Further, none of Geck et al or Mautner et al, or Brandstetter in view of Geck and Mautner disclose or suggest that the vinyl groups have an inhomogeneous distribution in the silicone core, the proportion in the outer region of the silicone core being higher than in the region of the center of gravity of the core. **See Claim 18.**

Further, none of Geck et al or Mautner et al, or Brandstetter in view of Geck and Mautner disclose or suggest that at least 85% of all of the vinyl groups are in an outer shell of the silicone core, wherein the outer shell of the silicone core is formed by 40% of the radius, and the volume of the outer shell is represented the formula $V=4\pi/3*r^3-4\pi/3*(0.6*r)^3$. **See Claim 19.**

Further, none of Geck et al or Mautner et al, or Brandstetter in view of Geck and Mautner disclose or suggest that the silicone rubber graft copolymer has a monomodal distribution with a polydispersity index of not more than 0.4. **See Claim 20.**

New Claim 21 relates to an impact-resistant molding material, comprising:

poly(meth)acrylate, and

at least one silicone rubber graft copolymer comprising

from 0.05 to 95% by weight, based on the total weight of the copolymer, of a core a)

comprising an organosilicon polymer which has the general formula

$(R_2SiO_{2/2})_x \cdot (RSiO_{3/2})_y \cdot (SiO_{4/2})_z$ where x = from 0 to 99.5 mol%, y = from 0.5 to 100 mol%, z

= from 0 to 50 mol%, where R means identical or different alkyl or alkenyl radicals having from 1 to 6 carbon atoms, aryl radicals, or substituted hydrocarbon radicals,

from 0 to 94.5% by weight, based on the total weight of the copolymer, of a polydialkylsiloxane layer b), and

from 5 to 95% by weight, based on the total weight of the copolymer, of a shell c) comprising organic polymers, wherein the core a) encompasses vinyl groups prior to the grafting process, and the shell c) is obtained via free-radical polymerization of a mixture in which acrylic esters and methacrylates are present,

wherein the ratio by weight of acrylic ester to methacrylate in the mixture for preparing the shell c) is in the range from 50:50 to 1:99;

wherein the impact-resistant molding material further comprises at least one styrene-acrylo-nitrile polymer;

wherein the styrene-acrylonitrile polymer is obtained via polymerization of a mixture which comprises

from 70 to 92% by weight of styrene,

from 8 to 30% by weight of acrylonitrile, and

from 0 to 22% by weight of other comonomers, based in each case on the total weight of the monomers to be polymerized.

New Claim 21 combines the limitations of Claims 1 and 8 and obviates the rejections over Geck and Mautner. Regarding the rejection over Brandstetter in view of Geck and Mautner it is noted that **Brandstetter does not disclose a silicon rubber graft copolymer** and that the combination of Brandstetter in view of Geck and Mautner does not disclose the superior properties obtained using such graft copolymer as discussed above.

Therefore, the rejections of

(1.) Claims 1, 2, 4-6 and 9-16 under 35 U.S.C. § 103(a) over Geck et al,
(2.) Claims 1, 2, 4-7 and 9-15 under 35 U.S.C. § 103(a) over Mautner et al, and
(4.) Claims 1, 2, 4-16 under 35 U.S.C. § 103(a) over Brandstetter in view of Geck and
Mautner, are believed to be unsustainable as the present invention is neither anticipated nor
obvious and withdrawal of these rejections is respectfully requested.


Further, MPEP 822.01 provides instructions regarding provisional double patenting
rejections. Since Serial No. 10/501,467 has not yet issued as a patent, Applicants request the
Examiner to withdraw the **provisional double patenting** rejection if it is the only issue
remaining in one case and convert the provisional rejection in the other application to a
double patenting rejection. MPEP 822.01.

This application presents allowable subject matter, and the Examiner is kindly
requested to pass it to issue. Should the Examiner have any questions regarding the claims or
otherwise wish to discuss this case, he is kindly invited to contact Applicants' below-signed
representative, who would be happy to provide any assistance deemed necessary in speeding
this application to allowance.

Respectfully submitted,

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